

Unit 9 Review C: Ch 37-39

In addition to knowing vocab definitions, be sure you can apply them to understand the following:

Ch 37

•Neuron Structure

- When are electrical vs chemical signals used to communicate?
- What part of a neuron transmits vs receives signals?
- How do presynaptic cells communicate with postsynaptic cells?
- What is the function of glial cells?
- What is the difference between sensory and motor neurons?
- Where are most interneurons found?
- What is the function of the CNS vs PNS?
 - What structures do they involve?

•Membrane Potential

- What is the charge of the inside of the cell compared to the outside?
 - How do K^+ and Na^+ concentrations contribute to this membrane potential?
- What happens in hyperpolarization vs depolarization?
 - In which direction do K^+ or Na^+ ions move for this to happen?
- What is the minimum depolarization needed to operate the voltage-gated ion channels called?
- What happens to the voltage-gated Na^+ vs K^+ channels AND the resulting membrane potential
 - At resting potential?
 - When a stimulus depolarizes the membrane (also during the rising phase)?
 - During the falling phase?
 - During the undershoot?
 - Apply these phases to the graph in Figure 37.11
- What if something prevented these Na^+ vs K^+ channels from opening vs closing?
- A second action potential cannot be initiated when? WHY?
- What ensures all signals in an axon travel in one direction?
- How do diameter and insulation affect the speed of an action potential?
- What two types of glia produce myelin sheaths?
 - Which are found in the CNS vs PNS?
- Why are gaps in the myelin sheath important?
 - What are they and their mode of conduction called?

•Communication at Synapses

- Most synapses are what type?
- What sequence of events occur to transmit a signal across a chemical synapse? (see Fig 37.15)
- What is the difference between excitatory vs inhibitory postsynaptic potentials
 - In terms of polarization?
 - In terms of permeability to Na^+ vs K^+ ?
- What is the difference between temporal and spatial summation?
- Be able to calculate the resulting membrane potential given the initial membrane potential and magnitude and number of IPSPs and EPSPS
- Which neurotransmitter(s) is /are
 - vital for muscle stimulation vs used at the neuromuscular junction in invertebrates?
 - is an analgesic (decreases perception of pain)?
 - affect sleep and mood?
 - an excitatory vs inhibitory transmitters?
 - disrupted by the bacterial toxin that causes botulism?

Ch 38

•Nervous Systems

- Lack of both cephalization and a CNS are associated with animals with what kinds of symmetry?
 - Give examples
- What is the function of astrocytes?
- What type of junction forms the blood-brain barrier?
- What is the difference between gray and white matter?
- What is cerebrospinal fluid, where is it found, and what is its function?

•Peripheral Nervous System

- What is the difference between
 - Afferent and efferent neurons?
 - The motor system and the autonomic nervous system?
 - The enteric vs sympathetic vs parasympathetic divisions of the autonomic nervous system?
 - Which two are antagonistic?
 - When would you expect increased vs decreased activity in each division?

•Vertebrate Brain

- Know the function of each of the following structures:

▪Cerebrum	▪Medulla oblongata	▪Occipital lobe
▪Corpus callosum	▪Amygdala	▪Parietal lobe
▪Thalamus	▪Hippocampus	▪Broca's area
▪Hypothalamus	▪Front lobe	▪Wernicke's area
▪Midbrain	▪Temporal lobe	
- What would happen if damage occurred to each particular structure?
- How is short-term vs long-term memory accessed?

•Sensory Receptors

- What is the correct sequence for the following stages in a sensory pathway:
 - Transduction, adaptation, perception, reception?
 - Which involves the conversion of stimulus energy into the generation of action potentials in sensory receptors?
- Why are you unaware of the constant sensation of wearing clothing?
- What the five categories of sensory receptors and what stimuli are detected by each?
- What five tastants do humans recognize? (What is umami?)

•Hearing and Equilibrium

- Most invertebrates use what structures that contain mechanoreceptors to detect orientation relative to gravity?
- What structure in the human ear
 - Equalizes pressure
 - Is important for equilibrium and senses head motion?
 - Is first struck by sound waves?
 - Houses the organ of Corti?
 - Be able to locate these structures on a diagram of the human ear!
- Where and how are AIR pressure waves converted to FLUID pressure waves?
- How are volume vs pitch detected?

•Vision

- What structures in the eyes of many arthropods are very effective at detecting movement?
- What is the function of each of the following structures of a single-lens eye?

▪Pupil	▪Rods
▪Iris	▪Cones
▪Lens	▪Fovea
▪Retina	

Ch 39

- Skeletal Muscle and its Contraction
 - What is the basic contractile unit of skeletal muscle called?
 - What do thin vs thick filaments consist of?
 - What are Z vs M lines?
 - What a contracting muscle shortens, what happens to the filaments?
 - What role do calcium ions play in muscle contraction? How?
 - What if the concentration of Ca^{+} was low?
 - What role does acetylcholine play in muscle contraction? How?
 - What sequences of events cause the excitation and contraction of a skeletal muscle fiber?
 - What are the components of a motor unit?
 - What is a state of sustained contraction without relaxation between successive stimuli called?
- Types of Skeletal Muscle Fibers
 - Compare and contrast slow oxidative, fast oxidative, and fast glycolytic muscle fibers in terms of
 - Contraction speed
 - Major ATP source
 - Rate of fatigue
 - Mitochondria
 - Myoglobin content
- Other Types of Muscle
 - What types of signals AND junctions are found in cardiac muscle?
 - What similarities and differences exist among skeletal, cardiac, and smooth muscle?
 - Where are each found?
- Locomotion
 - What types of animals use hydrostatic skeletons?
 - How do earthworms move?
- Behavior
 - What is the difference between proximate and ultimate causation?
 - Be able to apply the definition of each to examples
 - Why did male stickleback fish respond to a passing red truck?
 - What types of communication are more common among nocturnal vs diurnal animals?
 - How do honeybees communicate the presence AND location of food?
 - What is the significance of pheromones?
 - How could a cross-fostering study be conducted?
 - Be able to classify examples of each of the following:

▪Innate behavior	▪Cognition
▪Imprinting	▪Problem solving
▪Spatial learning	▪Social learning
▪Cognitive map	▪Agonistic behavior
▪Associative learning	▪Altruism
 - How can you distinguish individuals in a monogamous vs polygamous relationship?
 - How do the needs of the young help determine the mating system?
 - What is the difference between polygyny and polyandry?
 - How can you distinguish individuals in a polygynous vs polyandrous relationship?
 - How does paternal certainty depend on mating behavior?
 - What is the difference between intersexual and intrasexual selection?
 - Why might some animals risk their own life to save others?